

REMARKS/ARGUMENTS

Reconsideration of the above-identified application in view of the present amendment is respectfully requested. By this amendment, claims 1, 3, 4, and 6 are amended, claims 11-13 are canceled, and claims 14 to 18 are added. The interview of May 15, 2006 with the Examiner regarding the missing page of the office action is appreciated. As discussed, the Examiner sent the missing page to applicant's representative. The abstract is amended to comply with the proper language and format for an abstract listed in item 3 of the office action. No new matter was added by this amendment to the abstract. Claims 1 and 3 are amended to delete the phrases beginning with the word "preferably" in order to overcome the rejection under 35 U.S.C. 112 at item 4 of this office action.

Applicant appreciates the allowance of claims 4 and 6-10 if rewritten in independent form to include all of the limitations of the base claim and any intervening claims. Accordingly, claims 4 and 6-10 are rewritten to include all of the limitations of the base claim and intervening claims. Therefore, claims 4 and 6-10 are allowable.

Claim 1 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Al-Amin in view of Toyooka et al. and Separautzki et al. This rejection is respectfully traversed.

The M.P.E.P. sets forth the criteria for a rejection for obviousness under 35 U.S.C. §103 as follows:

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references

themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure.

See, M.P.E.P. § 706.02(j) citing In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Neither Al-Amin nor Toyooka et al. nor Separautzki et al. taken either alone or in combination discloses or suggests aligning a connecting piece radially to a tube. Al-Amin only shows an end cap 50 welded axially to the main body portion 32 of the container 30. The present invention allows to friction weld a solid and thick connecting piece radially onto a thin-walled tube.

Further, neither Al-Amin nor Toyooka et al. nor Separautzki et al. taken either alone or in combination discloses or suggests providing a friction depth (h) amounting to less than 80% of the wall thickness (WS) of the tube (22, 24). The figures of Al-Amin do not show a friction depth. The Examiner's indication of the friction depth (h) in Fig. 2 of Al-Amin appears instead to be related to the thickness of the weld bead.

Moreover, there is no motivation in Al-Amin, Toyooka et al., or Separautzki et al., or in the knowledge of one of ordinary skill in the art to combine the reference teachings of Al-Amin, Toyooka et al. and Separautzki et al. as proposed in the rejection of claim 1. The Office Action merely states that it would have been obvious to do so as to provide a member with high tensile strength/excellent fatigue resistance and an effective weld joint. However, Toyooka et al. is directed to a

process of secondary forming and heat treating a steel tube in order to provide an automobile structure member such as a chassis member, a bumper, a frame or the like (see paragraph 1 of Toyooka et al.). The components described by Toyooka et al. need to meet different requirements than that of a gas generator housing, which needs to be stable under extremely high temperatures and pressures. Toyooka et al. has nothing to do with welding a connecting piece onto a tube. Separautzki et al. teaches a process for manufacturing a motor vehicle wheel, which is also completely different from a gas generator housing. One of ordinary skill in the art would not consider to combine the teachings of Al-Amin, Toyooka et al. and Separautzki et al. as they are in different technical fields.

Furthermore, the method according to claim 1 provides unexpected results as explicitly disclose several times in the specification. In particular, on page 2, at line 15, the specification of the present invention mentions that the method according to claim 1 "provides a fine coordination of various parameters, which for the first time allow a relatively thick connecting piece to be laterally mounted to a thin walled tube by friction welding". On page 2, at lines 23-27, the specification also mentions that:

"As has been found in the costly development and in numerous investigations, unexpectedly a thick connecting piece can, however, be arranged onto a thin-walled tube from the exterior radially by means of friction welding, when the friction depth is not so high and the tube has a minimum tensile strength of at least 800 N/mm²".

Therefore, in view of the above-mentioned reasons claim 1 is allowable. Claims 3 and 5, which depend from claim 1, are allowable as depending from an allowable claim and also for their specific features recited therein.

Claim 2, which depends on claim 1, should be allowed for the same reasons as claim 1 and also for the additional feature that the tube (22, 24) has a welding surface which is non-machined before said friction welding process. None of the prior art either alone or in combination discloses or suggests this feature. Further, this feature produces an unexpected result as stated in the specification.

Specifically, on page 3, lines 1-15, the specification states that:

"A further surprise is the finding that the tube is preferably to remain non-machined on the welding surface before the welding process. This means that the tube is not machined or pressed flat in the region of the welding surface, i.e. the contact surface between the connecting piece and the outer surface of the tube, in order to provide as precise and large a contact surface as possible between the connecting piece, which is to be welded on the end face, and the peripheral wall. It is merely advantageous to clean the outside of the tube in the region of the welding surface. Thus, it is the flat end face of the connecting piece which meets the curved outer surface of the tube. Due to the tube being non-machined in the region of the welding surface, however, the peripheral wall has a higher stability in this region than in the machined state and can offer a greater resistance to the radial force which is exerted on it by the connecting piece. Although the contact surfaces are therefore less large and are aligned to each other less precisely, which can result in a longer welding time, this disadvantage is surprisingly more than compensated by the greater stability of the peripheral wall."

Therefore, in view of the above-mentioned reasons, claim 2 is allowable.

New claim 14, which depends on claim 1, should be allowed for the same reasons as claim 1 and also for the additional feature that the connecting piece is aligned radially with respect to a longitudinal axis of the tube. None of the cited prior art discloses or suggests this feature. Therefore, claim 14 is allowable.

New claim 15, which depends from claim 1, should be allowed for the same reasons as claim 1 and also for the additional steps recited therein. Claim 15 recites the steps of : g) providing another tube and another connecting piece; h) aligning the another connecting piece radially to the another tube such that an end face of the another connecting piece faces an outer face of the another tube; and i) joining the another tube and the another connecting piece by friction welding, by producing a relative rotation between the another tube and the another connecting piece and moving the another tube and the another connecting piece towards each other. None of the cited prior art discloses or suggests all of these steps recited in claim 15. Therefore, claim 15 is allowable.

New claim 16, which depends from claim 15, should be allowed for the same reasons as claim 1 and also for the additional the step of providing a friction depth amounting to less than 80% of a wall thickness of the another tube. None of the cited prior art discloses or suggests this step recited in claim 16. Therefore, claim 16 is allowable.

New claim 17, which depends from claim 1, should be allowed for the same reasons as claim 1 and also for the additional feature that the friction depth is more than 20% of the wall thickness of the tube. None of the cited prior art discloses or suggests this feature. Therefore, claim 17 is allowable.

New claim 18, which depends from claim 1, should be allowed for the same reasons as claim 1 and also for the additional feature that the friction depth is approximately two thirds of the wall thickness of the tube. None of the cited prior art discloses or suggests this feature. Therefore, claim 18 is allowable.

In view of the foregoing, it is respectfully submitted that the above-identified application is in condition for allowance, and allowance of the above-identified application is respectfully requested.

Please charge any deficiency or credit any overpayment in the fees for this amendment to our Deposit Account No. 20-0090.

Respectfully submitted,



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